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Reply to Office Action of: 1/26/2006
Atty. Docket No.: JJK-0330 (P2002J098)

REMARKS

The Examiner will note that independent claims 1, 13 and 26 have been amended. All three claims have been amended to specify that the VI increase of hydrotreated feedstock is less than 3 as supported in paragraph 19. The catalyst of claims 1 and 13 is specified as ZSM-48 by incorporating claims 5 and 16 into the claims on which they depend. The metals on the dewaxing catalyst for all three independent claims is specified as Pt and/or Pd by incorporating claims 6, 17 and 28 into the respective independent claims. The pour point of the dewaxed oil product in claims 1, 13 and 26 is set forth as -17°C or lower as supported in tables 3, 6, 9, 12, 15, 18, 21 and 24.

In claim 26, the 370°C+ yield is specified as greater than 50 wt. % as supported in Tables 3, 6, 9, 12, 15, 18, 21 and 24. The aromatics content after hydrofinishing with MCM-41 is defined as about zero as supported in paragraph 36.

THE EXAMINER'S REJECTION

Claims 1-4 and 6-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Xiao et al. (6,264,826).

Xiao was cited as disclosing a process for preparing lubricating base oils from a sulfur containing feedstock. The feedstock comprising greater than 50 wt. % of wax is fed into a mild hydrotreating zone wherein nitrogen and sulfur compounds are removed. The hydrotreating zone is operated at a temperature of from 260 to 427°C, at a pressure of from less than 11 Mpa, at LHSV of about 0.5, and at hydrogen rate of about 722 m³/m³. The hydrotreating is operated so that the conversion is less than 5%. The effluent from the hydrotreating zone is passed into a separation to separate gas from a liquid product which is then fed into a dewaxing zone containing a dewaxing catalyst including ZSM-23 and SAPO-11, a metal hydrogenation component (e.g., Pt or Pd). The dewaxing process is operated at temperature of from 400 to 900°F, at a pressure of from

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.45 to 20.8 Mpa, at LHSV of from about 0.1 to 5 hr⁻¹, and at hydrogen gas rates of from 89.1 to 1780 m³/m³. The product from the dewaxing zone is then passed into a hydrofinishing zone to provide a final product. (see col. 2, line 51 through col. 6, line 59; col. 8, line 53 through col. 10, line 40)

Xiao does not teach that the hydrotreated feedstock has VI increase less than 4 greater than the VI of the feedstock.

The Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Xiao by operating the hydrotreating zone at even more mild conditions to produce a hydrotreated product having VI increase less than 4 greater than the VI of the feedstock as claimed because operating the hydrotreating zone at severe conditions would produce a desired low sulfur product, but such conditions would cost more to operate and would hydrogenate desirable products such as olefins. Therefore, one of skill in the art would select to operate the Xiao process to produce a hydrotreated product as claimed when one desires to operate the hydrotreating zone with no hydrogenation or very little hydrogenation of desirable products (e.g., olefins.).

APPLICANTS' RESPONSE

Amended claim 1 specifies that the VI of the hydrotreated feedstock is less than 3 greater than the VI of the hydrotreated feedstock. According to Xiao, col. 8, lines 21-26, hydrotreating increases the VI by at least 5 VI units, preferably between 5 and 25 VI units. Thus applicants' hydrotreating produces the opposite result from the hydrotreating of Xiao.

The Examiner seeks to remedy this problem of VI increase in Xiao by stating that it would be obvious to operate Xiao at even more mild conditions to keep from hydrogenating desirable products such as olefins. First, applicants' claim 1 is directed to

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producing a product having a VI 135 or greater. The Examiner does not explain why one would want to preserve olefins to produce a high VI product (the olefins in feeds are not the poly - olefins of synthetic lubricants). Olefins would have a negative effect on VI. The Examples of Xiao (Tables II and III) show that hydrotreating significantly reduces the aromatics content of the feed. The Examiner does not indicate how using more mild conditions could achieve aromatics saturation while preserving olefin content. In contrast applicants teach that it is the high wax content as set forth in claim 1 that results in minimal VI increase during hydrotreating (see paragraph 19 of the specification).

Amended claim 1 now defines the dewaxing catalyst as ZSM-48. The dewaxing catalysts taught by Xiao in Col. 9, line 46 et seq. do not include ZSM-48. The use of ZSM-48 allows applicants to produce products with very low pour points of -17°C or less. This, as noted previously, is demonstrated in applicants' examples. In contrast, examples 6 and 7 of Xiao demonstrate dewaxing of the hydrotreated product with preferred dewaxing catalysts SAPO-11 and SSZ-32 produced points from -9 to -13°C. Thus the use of applicants' ZSM-48 allows production of a dewaxed oil having superior low temperature properties.

THE EXAMINER'S REJECTION

Claims 11-15 and 17-33 were rejected under 35 U.S.C. 103(a) as being unpatentable over Xiao et al. (6,264,826) in view of Kresge et al. (5,837,639). The Examiner noted that Xiao does not disclose that the hydrotreating catalyst (hydrofinishing catalyst) is MCM-41.

However, Kresge was cited as teaching the use of MCM-41 as a hydrotreating catalyst. (see col. 4, lines 57-68; col. 5, lines 1-16; col. 33, lines 33-37)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Xiao by using MCM-41 as a

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hydrofinishing catalyst because Kresge teaches that MCM-41 is a highly effective hydrotreating catalyst.

APPLICANTS' RESPONSE

Applicants' claims 13 and 26 have been amended in a manner similar to claim 1 with regard to VI increase, dewaxing catalyst and pour point. Claim 13 claims a mesoporous hydrofinishing catalyst from the M415 family. Claim 26 adds the additional feature of dewaxed product yield and aromatics content of hydrofinished product as well as specifying the catalyst as MCM-41.

With regard to claim 13, the features of the amended claim that distinguish over Xiao have been noted above. In addition, Xiao teaches that the hydrogenation catalyst be macroporous with defined pore properties (col. 12, lines 11-23). Kresge on the other hand teaches a mesoporous crystalline material. (col. 5, lines 46-47). Since the pore size distributions of mesoporous materials are different from the macroporous materials of Xiao, there is no teaching of the equivalence of mesoporous and macroporous materials for hydrofinishing purposes. The macroporous catalysts are generally amorphous whereas the mesoporous catalysts of Kresge are crystalline. Even given these differences, assuming arguendo that the M415 catalysts of Kresge are substituted in the process of Xiao, applicants' invention would not be taught or suggested as noted above for Xiao.

Amended claim 26 adds provisions that the yield of 370°C+ product using a ZSM-48 catalyst is greater than 50 wt.%, based on feed and that hydrofinished product using MCM-41 has an aromatics content of about zero. Neither of these features is taught or suggested by the cited combination of references.

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THE EXAMINER'S REJECTION

Claims 5 and 16 were rejected under 36 U.S.C. 103(a) as being unpatentable over references as applied to claims 1-4 and 15 above, and further in view of either Lucien et al. (4,906,350) or Cody et al. (5,935,417). The Examiner expressed the view that both Lucien and Cody teach that ZSM-5 and/or ZSM-48 can be utilized in a dewaxing process. (See Lucien, claim 2; Cody; col. 7, lines 10-16)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Baker by using a second catalyst such as ZSM-5 because both Lucien and Cody teaches that ZSM-5 and ZSM-48 can be used as a dewaxing catalyst.

APPLICANTS' RESPONSE

Claim 2 of Lucien cites that the dewaxing catalyst can be ZSM-5, ZSM-11, ZSM-23, ZSM-35, ZSM-12, ZSM-38, ZSM-48, offretite, ferrierite, zeolite beta, zeolite theta, zeolite alpha and mixtures thereof. As noted above, applicants' examples clearly demonstrate that ZSM-48 in the claimed process produces unique results not attainable with the other zeolites of claim 2 of Lucien.

Cody in Col. 7, lines 10-16 teaches dewaxing catalysts as including ZSM-5, ZSM-11, ZSM-12, Theta 1, ZSM-23, ZSM-35, ferrierite, ZSM-38, ZSM-48, ZSM-57, beta, mordenite, offretite, SAPO-11, SAPO-41, SAPO-31, MAPO-11 and MAPO-31 with ZSM-5, Theta -1, ZSM-23, ferrierite and SAPO-11 as preferred.

Applicants make the same point as noted above for Lucien. In addition, ZSM-5 and ZSM-48 are not equivalent in applicant's process as suggested by the Examiner.

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ZSM-5 cannot be used to make a 135 VI product as specified in claim 1. ZSM-5 is a cracking dewaxing catalyst as compared to ZSM-48 which is an isomerizing dewaxing catalyst. If ZSM-5 is used to dewax a feed having 50% or a greater wax content, the yield of 370°C+ product would be very small as ZSM-5 would crack most of the wax to product outside the lubricating oil range.

CONCLUSION

For the reasons set forth above, it is urged that applicants have made a patentable contribution to the art. Favorable action is solicited.

Respectfully submitted:

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